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VERIFICATION OF A TRANSLATION

I, Charles Edward SITCH BA,

Deputy Managing Director of RWS Group Ltd UK Translation Division, of Europa House, Marsham Way, Gerrards Cross, Buckinghamshire, England declare:

That the translator responsible for the attached translation is knowledgeable in the German language in which the below identified international application was filed, and that, to the best of RWS Group Ltd knowledge and belief, the English translation of the international application No. PCT/EP2004/002906 is a true and complete translation of the above identified international application as filed.

I hereby declare that all the statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the patent application issued thereon.

Date: August 9, 2005

Signature :

For and on behalf of RWS Group Ltd

Post Office Address :

Europa House, Marsham Way,
Gerrards Cross, Buckinghamshire,
England.

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Prepregs for fiber composites having high strength and resilience

The invention relates to pre�pregs containing
5 aminoplasts and intended for fiber composites having high strength and resilience, and a process for the production thereof.

The use of aminoplasts, such as melamine resins, for
10 improving the crease resistance, flameproofness and rotting resistance of sheet-like textile structures comprising cellulose acetate (GB 1 164 424 A1), polyamide (JP 53 028 707 A2) or polyesters (GB 2 028 352 B2) is known.

15 The production of fiber composites from pre�pregs based on mats or nonwovens comprising glass fibers (US 3 574 027 A), jute fibers (JP 10 016 123 A2), ceramic fibers (JP 04 316 836 A2), asbestos fibers (DE 19 10 097 A1) or flax fibers [Hagstrand, P., Polym. Compos. (2001), 22(4), 568-578], which are impregnated with aminoplasts, such as urea resins or melamine resins, is furthermore known.

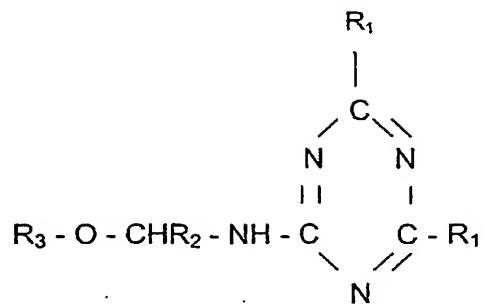
25 A disadvantage of the use of customary aminoplast laminating resins in the production of fiber composites is the unsatisfactory combination of strength and resilience properties of the composites.

30 Pre�pregs containing aminoplasts and intended for fiber composites which have improved strength and resilience are the aim of the invention.

35 The object of the invention was achieved by pre�pregs for fiber composites which, according to the invention, comprise from 50 to 85% by mass of sheet-like textile structures and from 15 to 50% by mass of polyaminotriazine ethers containing carbamic ester

groups and based on

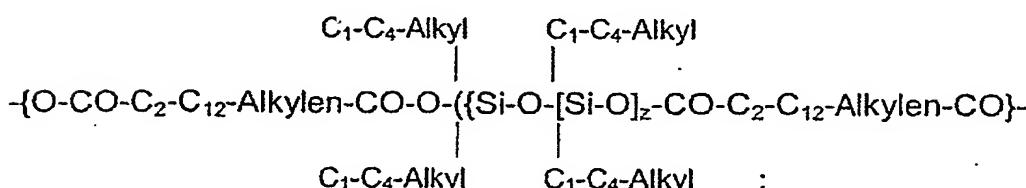
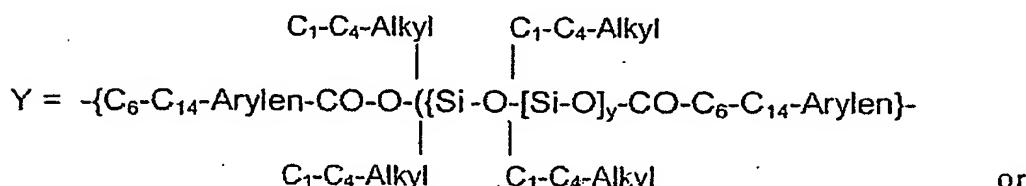
A) aminotriazine ethers of the structure



$R_1 = -NH_2, -NH-CHR_2-OH, -NH-CHR_2-O-R_3,$
 $-NH-CHR_2-O-R_4-OH, -CH_3, -C_3H_7, -C_6H_5, -OH,$
 phthalimido, succinimido-, $-NH-CO-C_5-C_{18}-alkyl,$
 $-NH-C_5-C_{18}-alkylene-OH,$
 $-NH-CHR_2-O-C_5-C_{18}-alkylene-NH_2,$
 $-NH-C_5-C_{18}-alkylene-NH_2,$

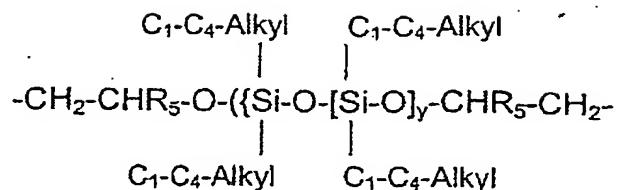
$R_2 = -H, -C_1-C_7\text{-alkyl};$
 $R_3 = -C_1-C_{18}\text{-alkyl}, -R_4\text{-OH},$

10 $R_4 = -CH(CH_3)-CH_2-O-C_2-C_{12}-alkylene-O-CH_2-CH(CH_3)-$,
 $-CH(CH_3)-CH_2-O-C_2-C_{12}-arylene-O-CH_2-CH(CH_3)-$,
 $-[CH_2-CH_2-O-CH_2-CH_2]_n-$,
 $-[CH_2-CH(CH_3)-O-CH_2-CH(CH_3)]_n-$,
 $-[O-CH_2-CH_2-CH_2-CH_2]_n-$,
 $-[(CH_2)_{2-8}-O-CO-C_6-C_4-arylene-CO-O-(CH_2)_{2-8}]_n-$,
 $-[(CH_2)_{2-8}-O-CO-C_2-C_{12}-alkylene-CO-O-(CH_2)_{2-8}]_n-$,
 where $n = 1$ to 200;
 - polyester sequences of the type
 $[(X)_r-O-CO-(Y)_s-CO-O(X)_r]-$, in which
 $X = \{(CH_2)_{2-8}-O-CO-C_6-C_{14}-arylene-CO-O-(CH_2)_{2-8}\}-$ or
 $\{(CH_2)_{2-8}-O-CO-C_2-C_{12}-alkylene-CO-O-(CH_2)_{2-8}\}-$;



r = 1 to 70; s = 1 to 70 and y = 3 to 50;

25 - polyether sequences containing siloxane groups
and of the type



where $R_5 = H$; $C_1\text{-C}_4\text{-alkyl}$ and $y = 3$ to 50 ;

5 - sequences based on alkylene oxide adducts of melamine of the type comprising 2-amino-4,6-di-C₂-C₄-alkyleneamino-1,3,5-triazine sequences:

5 - phenol ether sequences based on dihydric phenols and C₂-C₈-diols of the type comprising -C₂-C₈-alkylene-O-C₆-C₁₈-arylene-O-C₂-C₈-alkylene sequences;

and/or

10 B) mixtures of from 10 to 90% by mass of aminotriazine ethers A) and from 90 to 10% by mass of polyaminotriazine ethers having molar masses of from 300 to 5000, the polyaminotriazine ethers being formed by thermal autocondensation of aminotriazine ethers A),

and

15 C) isocyanates of the formula R₆(N = C = O)₂, where R₆ = C₆-C₁₄-arylene, C₄-C₁₈-alkylene and/or C₅-C₈-cycloalkylene, and/or oligomeric polyesters or polyethers having terminal isocyanate groups and molar masses of from 200 to 5000,

the molar ratio of triazine segment to carbamic ester groups being from 1 : 1 to 1 : 4.

25 In the prepgs, the textile substrate materials are preferably woven fabrics or nonwovens, in particular woven fabrics or nonwovens comprising glass fibers, carbon fibers, polyamide fibers, polyester fibers, polypropylene fibers and/or thermosetting plastic fibers.

30 Examples of polyamide fibers of which the textile substrate materials in the prepgs may consist are fibers of polyamide-6, polyamide-6,6, polyamide-11, polyamide-12 and poly-m-phenyleneisophthalamide.

35 Examples of polyester fibers of which the textile substrate materials in the prepgs may consist are fibers comprising polyethylene terephthalate,

polybutylene terephthalate or poly-p-oxybenzoic acid.

Examples of thermosetting plastic fibers of which the textile substrate materials in the prepregs may consist
5 are fibers comprising melamine resins or phenol resins.

In the polyaminotriazine ethers containing carbamic ester groups and present in the prepregs, the ratio of aldehyde component to triazine component is preferably
10 from 1 : 1 to 3 : 1.

Examples of suitable aminotriazine components in the aminotriazine ethers, which are defined by the substituent R₁ in the structural formula, are melamine, acetoguanamine, benzoguanamine, butyroguanamine, N-(4,6-diamino-1,3,5-triazin-2-yl)phthalimide and 2,4-diamino-6-succinimido-1,3,5-triazine.

Examples of suitable C₁-C₈-aldehyde components in the aminotriazine ethers, which are defined by the substituent R₂ in the structural formula, are formaldehyde, acetaldehyde and trimethylolacetaldehyde.

The aminotriazine ethers as a basis for the polyaminotriazine ethers containing carbamic ester groups in the prepreg can be prepared by reaction of aminotriazines with C₁-C₈-aldehydes to give aminotriazine precondensates, etherification of the aminotriazine precondensates with C₁-C₄-alcohols, and optionally subsequent transesterification with C₅-C₁₈-alcohols and/or diols of the type HO-R₄-OH. In the structural formula, the etherification component, which is a C₁-C₁₈-alcohol and/or a diol of the type HO-R₄-OH, is defined by R₃.

Examples of C₁-C₄-alcohols which may be present as etherification component R₃ in the aminotriazine ethers are methanol, isopropanol and butanol.

Examples of C₅-C₁₈-alcohols which may be present as etherification component R₃ in the aminotriazine ethers are ethylhexyl alcohol, dodecyl alcohol and stearyl alcohol.

Examples of diols of the type HO-R₄-OH, R₄ = C₂-C₁₈-alkylene, which may be present as etherification component R₃ in the aminotriazine ethers are ethylene glycol, butanediol, octanediol, dodecanediol and octadecanediol.

Examples of diols of the type HO-R₄-OH, R₄ = -[CH₂-CH(CH₃)-O-CH₂-CH(CH₃)]_n- and n = 1-200, which may be present as etherification component R₃ in the 5 aminotriazine ethers are polyethylene glycols having molar masses of from 500 to 5000.

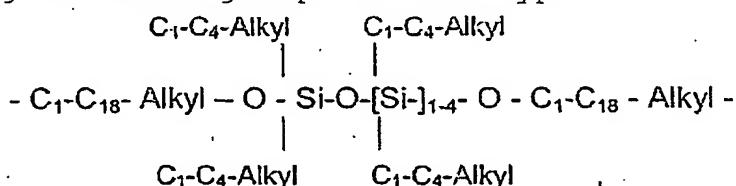
Examples of diols of the type HO-R₄-OH, R₄ = -[O-CH₂-CH₂-CH₂]_n- and n = 1-200, which may be present as etherification component R₃ in the aminotriazine ethers are polypropylene glycols having molar masses of from 5 500 to 5000.

Examples of diols of the type HO-R₄-OH, R₄ = -[O-CH₂-CH₂-CH₂]_n- and n = 1= 1-200, which may be present as etherification component R₃ in the aminotriazine ethers 10 are polytetrahydrofurans having molar masses of from 500 to 5000.

Examples of diols of the type HO-R₄-OH, R₄ = -[(CH₂)₂₋₈-O-CO-C₆-C₁₄-arylene-CO-O-(CH₂)₂₋₈]_n-, which may 15 be present as etherification component R₃ in the aminotriazine ethers are esters and polyesters based on saturated dicarboxylic acids, such as terephthalic acid, isophthalic acid or naphthalenedicarboxylic acid, and diols, such as ethylene glycol, butanediol, 20 neopentylglycol and/or hexanediol. A preferred ester is bis(hydroxyethyl) terephthalate.

Examples of diols of the type HO-R₄-OH, R₄ = -[(CH₂)₂₋₈-O-CO-C₂-C₁₂-alkylene-CO-O-(CH₂)₂₋₈]_n-, which may 25 be present as etherification component R₃ in the aminotriazine ethers are polyesters based on saturated dicarboxylic acids, such as adipic acid and/or succinic acid, unsaturated dicarboxylic acids, such as maleic acid, fumaric acid and/or itaconic acid, and diols, 30 such as ethylene glycol, butanediol, neopentylglycol and/or hexanediol.

Examples of diols of the type HO-R₄-OH, R₄ = sequences containing siloxane groups of the type



which may be present as etherification component R₃ in the aminotriazine ethers are 1,3-bis(hydroxybutyl)-tetramethyldisiloxane and 1,3-bis(hydroxyoctyl)-tetraethyldisiloxane.

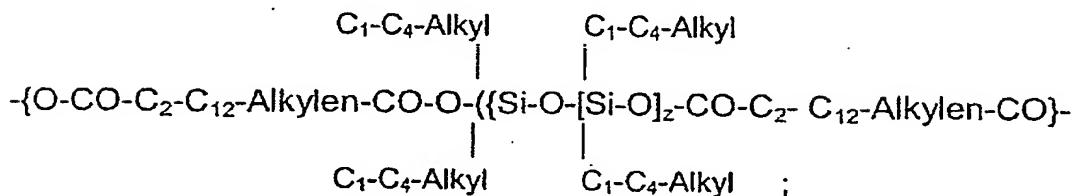
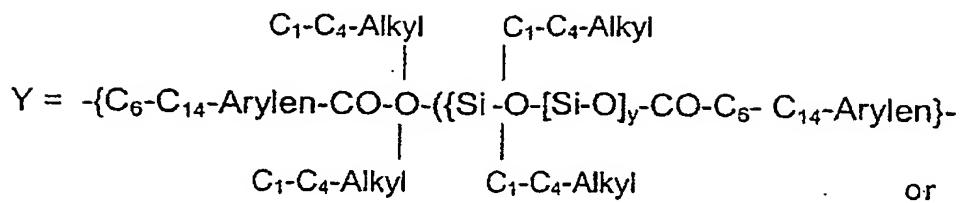
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Examples of polyester sequences comprising diols containing siloxane groups of the type HO-R₄-OH, R₄ = -[(X)_r-O-CO-(Y)_s-CO-O-(X)_r]-, which may be present as etherification component R₃ in the aminotriazine ethers,

10

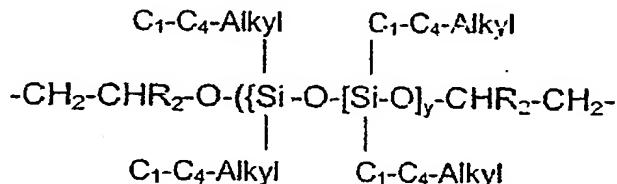
in which

X = -[(CH₂)₂₋₈-O-CO-C₆-C₁₄-arylene-CO-O-(CH₂)₂₋₈]- or
-[(CH₂)₂₋₈-O-CO-C₂-C₁₂-alkylene-CO-O-(CH₂)₂₋₈]-;



$r = 1$ to 70 ; $s = 1$ to 70 and $y = 3$ to 50 ;
 are polyesters containing hydroxyl end groups and based
 5 on aromatic C_6-C_{14} -arylenedicarboxylic acids, such as
 terephthalic acid or naphthalenedicarboxylic acid,
 aliphatic C_2-C_{12} -alkylenedicarboxylic acids, such as
 adipic acid, maleic acid or pimelic acid, diols, such
 as ethylene glycol, butanediol, neopentylglycol or
 10 hexanediol, and siloxanes, such as hexamethyldisiloxane
 or α,ω -dihydroxypolydimethylsiloxane.

Examples of polyetherdiols $HO-R_4-OH$ containing siloxane groups, R_4 = polyether sequences of the type



15 where $R_2 = H$; C_1-C_4 -alkyl and $y = 3$ to 50 ;
 which may be present as etherification component R_3 in
 the aminotriazine ethers are polyetherdiols based on
 siloxanes, such as hexamethyldisiloxane or α,ω -
 20 dihydroxypolydimethylsiloxane, and alkylene oxides,
 such as ethylene oxide or propylene oxide.

Examples of diols based on alkylene oxide adducts of

melamine of the type 2-amino-4,6-bis(hydroxy-C₂-C₄-alkyleneamino)-1,3,5-triazine which may be present as etherification component R₃ in the aminotriazine ethers are diols based on melamine and ethylene oxide or propylene oxide.

5 Examples of phenol ether diols based on dihydric phenols and C₂-C₈-diols of the bis(hydroxy-C₂-C₈-alkylene-O-)C₆-C₁₈-arylene type which may be present as

etherification component R₃ in the aminotriazine ethers are ethylene oxide adducts or propylene oxide adducts of diphenylopropene.

5 In addition to diols as polyhydric alcohols, trihydric alcohols, such as glycerol, or tetrahydric alcohols, such as erythritol, or mixtures thereof with dihydric alcohols may be present as etherification component R₃ in the aminotriazine ethers.

10

A preferred process for the preparation of polyaminotriazine ethers having molar masses of from 300 to 5000 as a basis for the polyaminotriazine ethers containing carbamic ester groups in the prepregs is the 15 thermal autocondensation of the aminotriazine ethers in continuous kneaders at from 120 to 220°C.

In the preprep, the polyaminotriazine ethers containing carbamic ester groups are preferably 20 polyaminotriazine ethers based on melamine, formaldehyde, methanol and diisocyanates of the type R₆(N = C = O)₂.

Examples of isocyanates of the formula R₆(N = C = O)₂ as 25 the isocyanate component in the polytriazine ethers containing carbamic ester groups are tetramethylene diisocyanate, hexamethylene diisocyanate, decamethylene diisocyanate, diphenylmethane diisocyanate, p-toluene diisocyanate or diisocyanatodiphenyl ether.

30

Preferred polyaminotriazine ethers containing carbamic ester groups are in particular polyaminotriazine ethers based on

35 B) mixtures of from 5 to 30% by mass of aminotriazine ethers A) and from 95 to 70% by mass of polyaminotriazine ethers having molar masses of from 300 to 5000, the polyaminotriazine ethers being formed by thermal autocondensation of aminotriazine

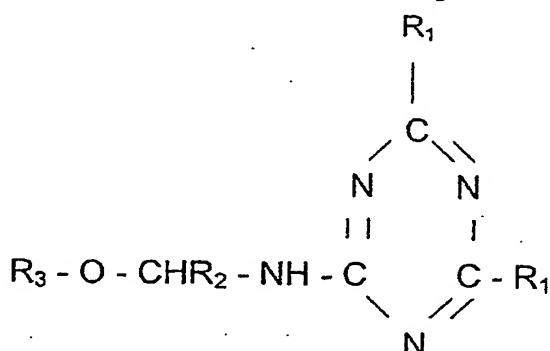
ethers A), and

C) isocyanates of the formula $R_6(N = C = O)_2$, where
R₄ = C₄-C₁₈-alkylene and/or C₅-C₈-cycloalkylene,
and/or oligomeric polyesters or polyethers
5 having terminal isocyanate groups and molar
masses of from 200 to 5000.

The prepregs for fiber composites having high strength
and resilience are produced by a process in which,
10 according to the invention, prepregs which comprise
from 50 to 85% by mass of sheet-like textile structures
and from 15 to 50% by mass of polyaminotriazine ethers

containing carbamic ester groups are produced by a melt application method in which mixtures of

A) aminotriazine ethers having the structure



5

$R_1 = -NH_2, -NH-CHR_2-OH, -NH-CHR_2-O-R_3,$
 $-NH-CHR_2-O-R_4-OH, -CH_3, -C_3H_7, -C_6H_5, -OH,$
 phthalimido, succinimido, $-NH-CO-C_5-C_{18}$ -alkyl,
 $-NH-C_5-C_{18}$ -alkylene-OH,
 10 $-NH-CHR_2-O-C_5-C_{18}$ -alkylene-NH₂,
 $-NH-C_5-C_{18}$ -alkylene-NH₂,

$R_2 = -H, -C_1-C_7$ -alkyl;

$R_3 = -C_1-C_{18}$ -alkyl, $-R_4-OH,$

15

$R_4 = -CH(CH_3)-CH_2-O-C_2-C_{12}$ -alkylene-O-CH₂-CH(CH₃)-,

 $-CH(CH_3)-CH_2-O-C_2-C_{12}$ -arylene-O-CH₂-CH(CH₃)-,
 $-[CH_2-CH_2-O-CH_2-CH_2]_n-$,
 $-[CH_2-CH(CH_3)-O-CH_2-CH(CH_3)]_n-$,

20

$-[O-CH_2-CH_2-CH_2-CH_2]_n-$,

 $-[(CH_2)_{2-8}-O-CO-C_6-C_{14}$ -arylene-CO-O-(CH₂)₂₋₈]_n-,
 $-[(CH_2)_{2-8}-O-CO-C_2-C_{12}$ -alkylene-CO-O-(CH₂)₂₋₈]_n-,

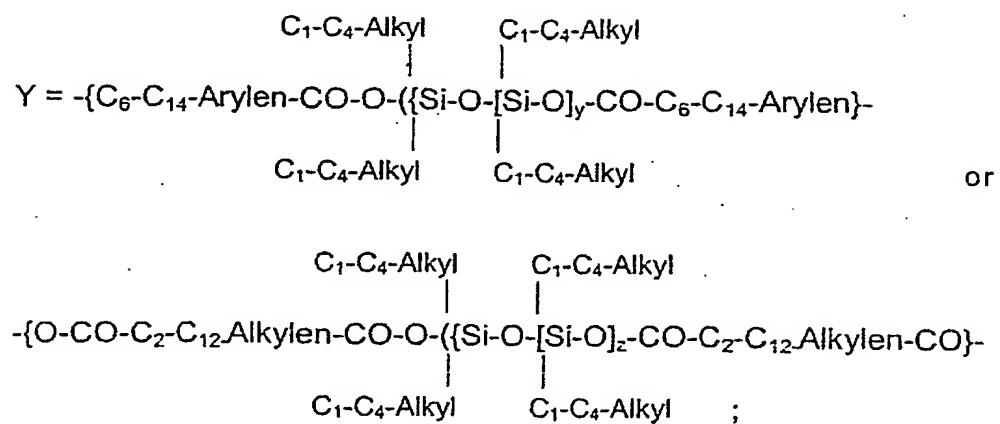
where n = 1 to 200;

25

- polyester sequences containing siloxane groups
of the type $-[(X)_r-O-CO-(Y)_s-CO-O-(X)_r]-$,

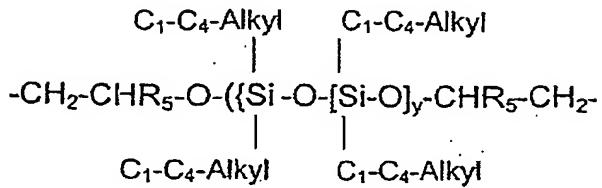
in which

$X = -(CH_2)_{2-8}-O-CO-C_6-C_{14}$ -arylene-CO-O-(CH₂)₂₋₈ or
 $-[(CH_2)_{2-8}-O-CO-C_2-C_{12}$ -alkylene-CO-O-(CH₂)₂₋₈]-;



r = 1 to 70; s = 1 to 70 and y = 3 to 50;

- polyether sequences containing siloxane groups of the type



5

where R₅ = -H; -C₁-C₄-alkyl and y = 3 to 50;

- sequences based on alkylene oxide adducts of melamine of the type comprising 2-amino-4,6-di-C₂-C₄-alkyleneamino-1,3,5-triazine sequences:

10

- phenol ether sequences based on dihydric phenols and C₂-C₈-diols of the type comprising -C₂-C₈-alkylene-O-C₆-C₁₈-arylene-O-C₂-C₈-alkylene sequences;

15

and/or

B) mixtures of from 10 to 90% by mass of aminotriazine ethers A) and from 90 to 10% by mass of polyaminotriazine ethers having molar masses of from 300 to 5000, the polyaminotriazine ethers being formed by thermal autocondensation of aminotriazine ethers A), and

C) isocyanates of the formula R₆(N = C = O)₂, where R₆ = C₆-C₁₄-arylene, C₄-C₁₈-alkylene and/or C₅-C₈-cycloalkylene, and/or oligomeric polyesters or polyethers having terminal isocyanate groups and molar masses of from 200 to 5000,

the molar ratio of diisocyanate to the sum of imino groups and amino groups in the triazine sequence being from 0.15 : 1 to 0.65 : 1, and it being possible for the mixtures to contain from 0.05 to 2% by mass, based on the aminotriazine ethers, of latent curing agents,

are melted at temperatures of from 85 to 130°C, reacted, and applied to the textile substrate materials.

5

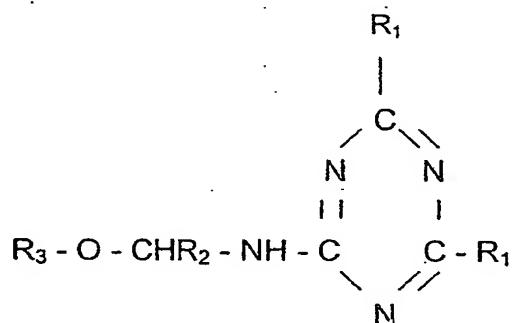
Mixtures which predominantly comprise aminotriazine ethers and diisocyanates can be applied to the moving sheet-like web during the melt application method by applying the low-viscosity melt by means of a knife
10 coater or by spraying on.

Extrusion coating units are suitable in the melt application method for melting and applying relatively high-viscosity mixtures which predominantly comprise polyaminotriazine ethers and diisocyanates.

5

A second process for the production of prepgs for fiber composites having high strength and resilience comprises producing the prepgs according to the invention, which comprise from 50 to 85% by mass of sheet-like textile structures and from 15 to 50% by mass of polyaminotriazine ethers containing carbamic ester groups, by a liquid application method, in which dispersions in C₅-C₁₂-hydrocarbons and/or C₃-C₁₂-ketones or solutions in dimethyl sulfoxide, dimethylformamide and/or dimethylacetamide, having a solids content of 25 to 70% by mass, comprising

A) aminotriazine ethers of the structure



20 R₁ = -NH₂, -NH-CHR₂-OH, -NH-CHR₂-O-R₃,
 -NH-CHR₂-O-R₄-OH, -CH₃, -C₃H₇, -C₆H₅, -OH,
 phthalimido, succinimido, -NH-CO-C₅-C₁₈-alkyl,
 -NH-C₅-C₁₈-alkylene-OH,
 -NH-CHR₂-O-C₅-C₁₈-alkylene-NH₂,
25 -NH-C₅-C₁₈-alkylene-NH₂,

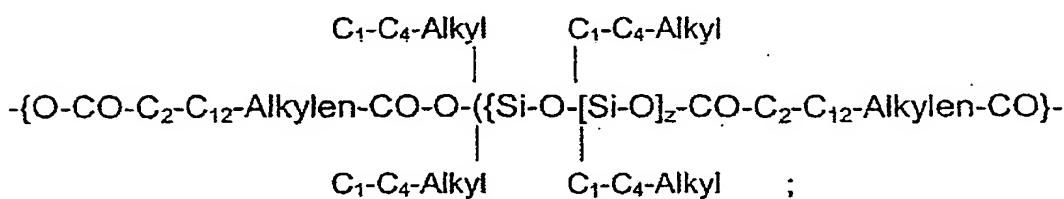
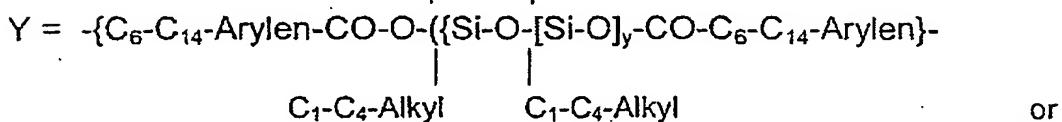
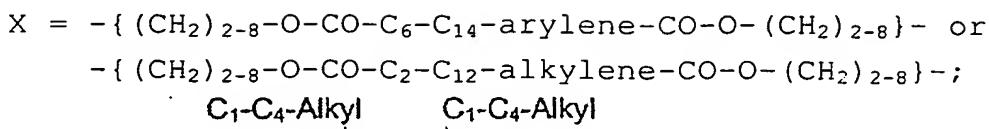
R₂ = -H, -C₁-C₇-alkyl;

R₃ = -C₁-C₁₈-alkyl, -R₄-OH,

30 R₄ = -CH(CH₃)-CH₂-O-C₂-C₁₂-alkylene-O-CH₂-CH(CH₃)-,
 -CH(CH₃)-CH₂-O-C₂-C₁₂-arylene-O-CH₂-CH(CH₃)-,
 -[CH₂-CH₂-O-CH₂-CH₂]_n-,

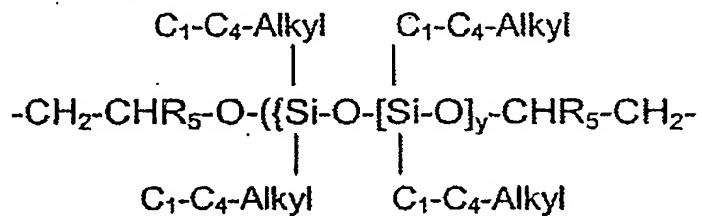
- [CH₂-CH(CH₃)-O-CH₂-CH(CH₃)]_n-,
- [O-CH₂-CH₂-CH₂-CH₂]_n-,
- [(CH₂)₂₋₈-O-CO-C₆-C₁₄-arylene-CO-O-(CH₂)₂₋₈]_n-,
- 5 - [(CH₂)₂₋₈-O-CO-C₂-C₁₂-alkylene-CO-O-(CH₂)₂₋₈]_n-,
where n = 1 to 200;
- polyester sequences containing siloxane groups
of the type -[(X)_r-O-CO-(Y)_s-CO-O-(X)_r]-,

in which



5 r = 1 to 70; s = 1 to 70 and y = 3 to 50;

- polyether sequences containing siloxane groups of the type



where R₅ = -H; -C₁-C₄-alkyl and y = 3 to 50;

10 - sequences based on alkylene oxide adducts of melamine of the type comprising 2-amino-4,6-di-C₂-C₄-alkyleneamino-1,3,5-triazine sequences:

15 - phenol ether sequences based on dihydric phenols and C₂-C₈-diols of the type comprising -C₂-C₈-alkylene-O-C₆-C₁₈-arylene-O-C₂-C₈-alkylene sequences;

and/or

20 B) mixtures of from 10 to 90% by mass of aminotriazine ethers A) and from 90 to 10% by mass of polyaminotriazine ethers having molar masses of from 300 to 5000, the polyaminotriazine ethers being formed by autocondensation of triazine ethers A), and

25

5 C) isocyanates of the formula $R_6(N = C = O)_2$,
where $R_6 = -C_6-C_{14}-\text{arylene}$, $-C_4-C_{18}-\text{alkylene}$ and/or
 $-C_5-C_8-\text{cycloalkylene}$, and/or oligomeric polyesters
or polyethers having terminal isocyanate groups
and molar masses of from 200 to 5000,

the molar ratio of diisocyanate to the sum of imino groups and amino groups in the triazine sequence being from 0.15 : 1 to 0.65 : 1, and it being possible for the mixtures to contain from 5 0.05 to 2% by mass, based on the aminotriazine ethers, of latent curing agents, are brought into contact at temperatures from 5 to 80°C with the textile substrate materials and reacted at from 80 to 120°C/from 0.1 to 1 bar and 10 dried.

Examples of C₅-C₁₂-hydrocarbons which can be used as dispersants in the liquid application method are pentane, isooctane and dodecane.

15 Examples of C₃-C₁₂-ketones which can be used as dispersants in the liquid application method are methyl ethyl ketone, diisobutyl ketone and ethyl hexyl ketone.

20 In the melt application method and in the liquid application method for the production of prepgs, 2,4, 6-tris(methoxymethylamino)-1,3,5-triazine is preferably used as the aminotriazine ether.

25 In the melt application method and in the liquid application method for the production of prepgs, the latent curing agents used are preferably weak acids, in particular

- blocked sulfonic acids,
- alkali metal salts or ammonium salts of phosphoric acid,
- C₁-C₁₂-alkyl esters or C₂-C₈-hydroxyalkyl esters of aromatic C₆-C₁₄-carboxylic acids or inorganic acids,
- salts of melamine or guanamines with aliphatic C₁-C₁₈-carboxylic acids,
- anhydrides, monoesters or monoamides of C₄-C₂₀-dicarboxylic acids,
- monoesters or monoamides of copolymers of

ethylenically unsaturated C₄-C₂₀-dicarboxylic anhydrides and ethylenically unsaturated monomers of the type comprising C₂-C₂₀-olefins and/or C₈-C₂₀-vinyl aromatics, and/or
5 - salts of C₁-C₁₂-alkylamines or alkanolamines with aliphatic C₁-C₁₈-carboxylic acids, aromatic C₆-C₁₄-carboxylic acids or alkylaromatic carboxylic acids and inorganic acids of the hydrochloric acid, sulfuric acid or phosphoric acid type.
10

Examples of blocked sulfonic acids which can be used as latent curing agents in the production of prepregs are benzil monooxime tosylate, ethyl α -cyclohexylsulfonyl-
5 oxyiminophenylacetate, acetone oxime p-benzoylbenzenesulfonate, α -(4-nitrobenzenesulfonyloxyimino)benzyl cyanide, 2-nitrobenzyl sulfonate and 2-methylsulfonyloxyimino-4-phenylbut-3-ene nitrile.

10 Examples of aliphatic C₄-C₁₈-carboxylic acids which can be used as latent curing agents in the production of the prepregs are butyric acid, caproic acid, palmitic acid, stearic acid and oleic acid.

15 Examples of alkali metal salts or ammonium salts of phosphoric acid which can be used as latent curing agents in the production of prepregs are ammonium hydrogen phosphate, sodium polyphosphate and potassium hydrogen phosphate.

20 Examples of C₁-C₁₂-alkyl esters or C₂-C₈-hydroxyalkyl esters of aromatic C₆-C₁₄-carboxylic acids or inorganic acids which can be used as latent curing agents in the production of the prepregs are dibutyl phthalate,
25 diglycol phthalate and/or glycol trimellitate.

Examples of salts of melamine or guanamines with aliphatic C₁-C₁₈-carboxylic acids which can be used as latent curing agents in the production of the prepregs
30 are melamine formate, melamine citrate and/or acetoguanamine butyrate.

Examples of anhydrides, monoesters or monoamides of C₄-C₂₀-dicarboxylic acids which can be used as latent
35 curing agents in the production of the prepregs are maleic anhydride, mono-C₁-C₁₈-alkyl maleates, such as monobutyl maleate, monoethylhexyl maleate or monostearyl maleate, or mono-C₁-C₁₈-alkylmaleamides, such as monoethyl maleamide, monoctyl maleamide or

monostearylmaleamide.

Examples of monoesters or monoamides of copolymers of ethylenically unsaturated C₄-C₂₀-dicarboxylic anhydrides and ethylenically unsaturated monomers of the type comprising C₂-C₂₀-olefins and/or C₈-C₂₀-vinyl aromatics which can be used as latent curing agents in the production of the prepregs are monoesters or monoamides of copolymers of maleic anhydride and C₃-C₈- α -olefins of the type comprising isobutene, diisobutene and/or 4-

5

10

methylpentene and/or styrene having a molar ratio of maleic anhydride to C₃-C₈- α -olefin or styrene or corresponding monomer mixtures of from 1 : 1 to 1 : 5.

5 Examples of salts of C₁-C₁₂-alkylamines or alkanolamines with aliphatic C₁-C₁₈-carboxylic acids, aromatic C₆-C₁₄-carboxylic acids or alkylaromatic carboxylic acids and inorganic acids of the hydrochloric acid, sulfuric acid or phosphoric acid type which can be used as latent
10 curing agents in the production of the prepgs are ethanolammonium chloride, triethylammonium maleate, diethanolammonium phosphate and/or isopropylammonium p-toluenesulfonate.

15 Fiber composites which are produced using the prepgs described above are furthermore according to the invention.

For the production of the fiber composites, the prepgs which comprise from 50 to 85% by mass of sheet-like textile structures and from 15 to 50% by mass of polyaminotriazine ethers containing carbamic ester groups can be cured at temperatures of from 135°C to 190°C and in residence times of from 4 to 90 min in the form of a single layer or a plurality of layers, 25 preferably in presses at from 40 to 120 bar.

The curing of the prepgs at temperatures of from 135°C to 190°C and in residence times of from 4 to 90 min can also be effected after lamination of the prepgs which comprise from 50 to 85% by mass of sheet-like textile structures and from 15 to 50% by mass of polyaminotriazine ethers containing carbamic ester groups with sheet-like substrate materials comprising wood, metal, plastic, paper, board, sheet-like textile structures or prepgs based on substrate materials, such as sheet-like textile structures or paper, which are impregnated with laminating resins, such as epoxy resins, phenol resins or unsaturated polyester resins, preferably in presses with shaping

and from 40 to 120 bar.

Examples of sheet-like substrate materials which can be used in the production of fiber composites by lamination with prepregs comprising from 50 to 85% by mass of sheet-like textile structures and from 15 to 50% by mass of polyaminotriazine ethers containing carbamic ester groups are copper foils, kraft paper prepregs, polystyrene foam, polyolefin foam, metal nets and phenol resin/glass fiber prepregs.

The fiber composites according to the invention are preferably suitable for use as heat protection clothing, fire protection blankets, electrical insulation papers, flameproofed components in electronics, construction parts and vehicle fittings.

5 The invention is explained by the following examples:

10 Example 1

15 1.1 Preparation of the mixture of aminotriazine ether
and polyaminotriazine ether

A melamine dispersion is prepared in a 30 l stirred
15 autoclave by introducing 1.0 kg of melamine in 13.7 kg
of methanol at 95°C and, after the pH has been adjusted
to 6, a mixture of 3 kg of formaldehyde, 1.29 kg of
methanol and 4.31 kg of water, which is preheated to
20 90°C, is metered under pressure into the stirred
autoclave as the aldehyde component, and the reaction
mixture is reacted at a reaction temperature of 95°C
and in a reaction time of 5 min.

25 After cooling to 65°C, a pH of 9 is established by
adding N/10 sodium hydroxide solution, and the
etherified aminotriazine resin condensate dissolved in
the water-methanol mixture is transferred, after
addition of 2.23 kg of butanol, into a first vacuum
30 evaporator, in which the solution of the etherified
aminotriazine resin condensate is concentrated at 80°C
to give a highly concentrated aminotriazine resin
solution which has a solids content of 75% by mass and
a butanol content of 10% by mass.

35 The highly concentrated solution of the etherified
aminotriazine resin is subsequently transferred to a
second vacuum evaporator and concentrated at 90°C to
give a syrupy melt which has a solids content of 95% by
mass and a butanol content of 5% by mass.

1.2 Production of the prepreg and pressing to give the fiber composite

5 The syrupy melt is metered at 2.6 kg/h into the feed hopper of a GL 27 D44 (Leistritz) laboratory extruder having vacuum devolatilization zones after the feed zone and before the product discharge, sidestream metering for liquid media and 100 x 2 mm flat sheet
10 die, temperature profile 180°C/220°C/220°C/220°C/200°C/170°C/140°C/ 110°C/90°C/90°C/90°C,

extruder speed 200 min⁻¹, the aminotriazine ether is subjected to thermal condensation and the volatile fractions are removed by devolatilization at 100 mbar. The analysis sample of aminotriazine ether/polyaminotriazine ether mixture taken from the vacuum devolatilization nozzle has a molar mass of 650.

5 2.25 kg/h of hexamethylene diisocyanate are metered into the melt of the polyaminotriazine ether/amino-triazine ether mixture by means of sidestream metering and homogenized with the mixture. After a second vacuum devolatilization at 150 mbar, the melt is extruded through the flat sheet die onto a glass fiber fabric moving at 5 m/min (mass per unit area 200 g/m²), which fabric passes through a heating tunnel (120°C, average 10 residence time 8 min) after the impregnation.

10 15

The impregnated glass fiber fabric has a resin content of 44% by mass. ATR investigations give a ratio of triazine segment to carbamic ester groups of 1:2.6.

20

The impregnated glass fiber fabric is pressed in a press at 160°C/30 bar for 20 min with curing.

25

The laminate has the following material characteristics:

Flexural strength: 320 N/mm² Impact strength: 78 kJ/m²
Tensile strength: 180 N/mm² Elongation: 3%.

30

If a laminate having the same resin content is produced under analogous conditions but without addition of the diisocyanate, the following material characteristics are obtained:

Flexural strength: 290 N/mm² Impact strength: 52 kJ/m²
Tensile strength: 168 N/mm² Elongation: 2.2%.

35

Example 2

2.1 Preparation of the aminotriazine ether

An aminotriazine dispersion is prepared in a 30 l stirred autoclave by introducing 0.9 kg of melamine and 0.1 kg of benzoguanamine in 15 kg of methanol at 95 °C and, after the pH has been adjusted to 6.2, a mixture 5 of 2.7 kg of formaldehyde, 0.3 kg of glyoxal and 3 kg of water, which is preheated to 90 °C, is metered under pressure into the stirred autoclave as

the aldehyde component, and the reaction mixture is reacted at a reaction temperature of 90°C and in a reaction time of 10 min.

5 After cooling to 65°C, a pH of 9.2 is established by adding N/10 sodium hydroxide solution, and the etherified aminotriazine resin condensate dissolved in the water-methanol mixture is transferred, after addition of 0.6 kg of butanol, into a first vacuum
10 evaporator, in which the solution of the etherified aminotriazine resin condensate is concentrated at 80°C to give a highly concentrated aminotriazine resin solution which has a solids content of 76% by mass and a butanol content of 3.1% by mass.

15

The highly concentrated solution of the etherified aminotriazine resin is subsequently mixed in a mixing zone with 0.8 kg of Simusol BPLE (oligoethylene glycol ether of bisphenol A), transferred to a second vacuum
20 evaporator and concentrated at 90°C to give a syrupy melt which has a solids content of 98% by mass and a butanol content of 2.2% by mass.

2.2 Production of the prepreg and pressing to give the
25 fiber composite

The syrupy melt is metered at 2.8 kg/h into the feed hopper of a GL 27 D44 (Leistritz) laboratory extruder having vacuum devolatilization zones after the feed
30 zone and before the product discharge, sidestream metering for liquid media and 100 x 2 mm flat sheet die, temperature profile 180°C/220°C/220°C/220°C/200°C/
170°C/140°C/ 110°C/90°C/90°C/90°C, extruder speed 200 min⁻¹, the aminotriazine ether is subjected to
35 thermal condensation and the volatile fractions are removed by devolatilization at 100 mbar.

The analysis sample of aminotriazine ether/polyamino-triazine ether mixture taken from the vacuum

devolatilization nozzle has a molar mass of 3800.

1.9 kg/h of tetramethylene diisocyanate are metered into the melt of the aminotriazine ether/polyamino-
5 triazine ether mixture by means of sidestream metering and homogenized with the mixture. After a second vacuum devolatilization at 150 mbar, the melt is extruded through the flat sheet die onto a glass fiber fabric moving at 3.5 m/min (mass per unit area 200 g/m²), which
10 fabric passes through a heating tunnel (120°C, average residence time 8 min) after the impregnation.

The impregnated glass fiber fabric has a resin content of 50% by mass. ATR investigations of the prepreg give a ratio of triazine sequence to carbamic ester groups of 1:3.7.

5

The impregnated glass fiber fabric is pressed in a press at 160°C/30 bar for 20 min with curing.

10 The laminate has the following material characteristics:

Flexural strength: 330 N/mm² Impact strength: 74 kJ/m²

Tensile strength: 188 N/mm² Elongation: 2.8%.

15 If a laminate having the same resin content is produced under analogous conditions but without addition of the diisocyanate, the following material characteristics are obtained:

Flexural strength: 295 N/mm² Impact strength: 50 kJ/m²

Tensile strength: 175 N/mm² Elongation: 2.0%.

20

Example 3

25 For the production of the prepreg, 2,4,6-tris(methoxymethylamino)-1,3,5-triazine is used as the aminotriazine ether, bis(hydroxyethyl) terephthalate as the diol component for the transesterification and diisocyanatodiphenyl ether as the diisocyanate.

30 The transesterification and thermal autocondensation of the aminotriazine ether is carried out in a measuring kneader (from Haake Polylab system 540p). After preheating to 170°C, 32.5 g of bis(hydroxyethyl) terephthalate and 39.5 g of 2,4,6-tris(methoxymethylamino)-1,3,5-triazine are metered into the kneading 35 chamber and kneaded at a speed of 50 min⁻¹ until a torque of 3 Nm is reached after a reaction time of 6 min. After cooling, the mixture of aminotriazine ether and polyaminotriazine ether is milled in a 100 UPZ/II universal mill (Alpine Hosokawa) with impact

disk and 2 mm sieve. GPC investigations give a molar mass of 1650.

5 50 g of the mixture of aminotriazine ether and polyaminotriazine ether are dissolved in 200 ml of dimethyl sulfoxide at 110°C, the solution is cooled to 50°C, 68 g of diisocyanatodiphenyl ether and 2 g of dibutyl phthalate are then added and the mixture is homogenized.

The viscous solution is applied by means of a knife coater to a nonwoven cellulose web (120 g/m², Lenzing AG, Austria), and the impregnated nonwoven cellulose is fixed in a needle bar frame and dried in a vacuum

5 drying oven for 5 hours at 115°C/0.1 bar. The prepregs thus produced have a resin coat of about 50%. ATR investigations of the prepreg give a ratio of triazine sequence to carbamic ester groups of 1:3.

10 The prepregs are cut to a size of 30 x 20 cm. For the production of a shaped article having curved edges in the form of a U-profile, 3 preprepregs plus an untreated nonwoven cellulose as the top are placed one on top of the other in a compression mold (30 x 20 cm) preheated

15 to 160°C, and the press is slowly closed, the uncured preprepregs being capable of being easily molded. Under pressure of 160 bar, the temperature is increased to 180°C and molding is effected for 20 min. The finished workpiece is removed and slowly cooled, and the flash

20 formed by emerging resin at the immersion edge of the compression mold is ground off.

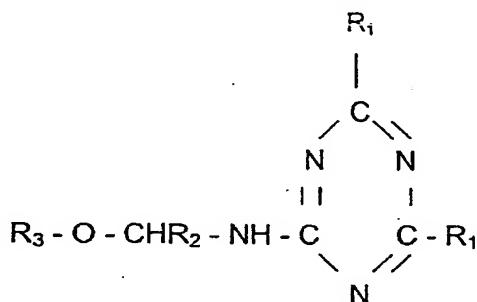
Test specimens cut out from the workpiece have, in the bending test, a modulus of elasticity of 6.5 GPa, an

25 elongation at maximum force of 3.2% and an impact strength of 13 kJ/m².

Patent claims

1. A prepreg for fiber composites having high strength and resilience, characterized in that the prepreg comprises from 50 to 85% by mass of sheet-like textile structures and from 15 to 50% by mass of polyaminotriazine ethers containing carbamic ester groups and based on

5 A) aminotriazine ethers of the structure



10

$R_1 = -N H_2, -N H - C H R_2 - O H, -N H - C H R_2 - O - R_3,$
 $-N H - C H R_2 - O - R_4 - O H, -C H_3, -C_3 H_7, -C_6 H_5, -O H,$
phthalimido, succinimido-, $-N H - C O - C_5 - C_{18}$ -alkyl,
 $-N H - C_5 - C_{18}$ -alkylene-OH,
 $15 -N H - C H R_2 - O - C_5 - C_{18}$ -alkylene-NH₂,
 $-N H - C_5 - C_{18}$ -alkylene-NH₂,

$R_2 = -H, -C_1 - C_7$ -alkyl;

$R_3 = -C_1 - C_{18}$ -alkyl, $-R_4 - O H,$

20

$R_4 = -C H (C H_3) - C H_2 - O - C_2 - C_{12}$ -alkylene-O-C₂-CH(C₂H₃)-,
 $-C H (C H_3) - C H_2 - O - C_2 - C_{12}$ -arylene-O-C₂-CH(C₂H₃)-,
 $-[C H_2 - C H_2 - O - C H_2 - C H_2]_n - ,$
 $-[C H_2 - C H (C H_3) - O - C H_2 - C H (C H_3)]_n - ,$

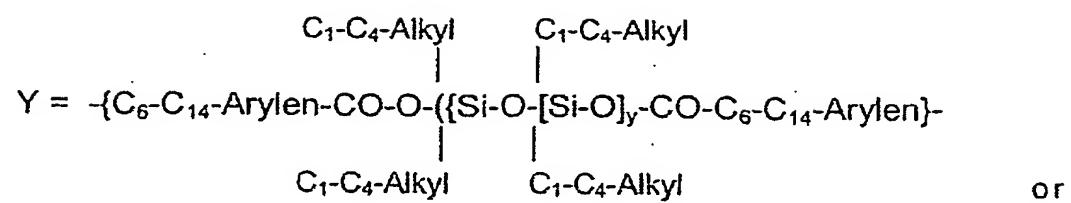
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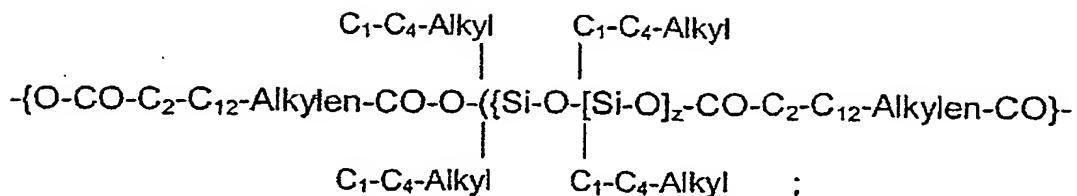
$-[O - C H_2 - C H_2 - C H_2]_n - ,$
 $-[(C H_2)_{2-8} - O - C O - C_6 - C_{14}$ -arylene-CO-O-(C₂H₃)₂₋₈]_n - ,
 $-[(C H_2)_{2-8} - O - C O - C_2 - C_{12}$ -alkylene-CO-O-(C₂H₃)₂₋₈]_n - ,
where n = 1 to 200;

30

- polyester sequences containing siloxane groups
of the type $-[(X)_r - O - C O - (Y)_s - C O - O - (X)_r] -$, in
which

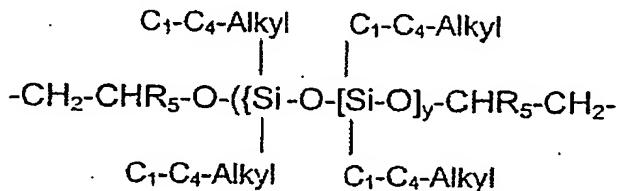
$X = \{(C H_2)_{2-8} - O - C O - C_6 - C_{14}$ -arylene-CO-O-(C₂H₃)<sub>2-8\} or
 $\{(C H_2)_{2-8} - O - C O - C_2 - C_{12}$ -alkylene-CO-O-(C₂H₃)_{2-8\};}</sub>





$r = 1$ to 70; $s = 1$ to 70 and $y = 3$ to 50;

5 - polyether sequences which contain siloxane groups and are of the type



where $R_5 = H$; $C_1\text{-C}_4\text{-alkyl}$ and $y = 3$ to 50;

10 - sequences based on alkylene oxide adducts of melamine of the type comprising 2-amino-4,6-di- $c_2\text{-c}_4$ -alkyleneamino-1,3,5-triazine sequences;

15 - phenol ether sequences based on dihydric phenols and $C_2\text{-C}_8$ -diols of the type comprising $-C_2\text{-C}_8\text{-alkylene-O-C}_6\text{-C}_{18}\text{-arylene-O-C}_2\text{-C}_8\text{-alkylene}$ sequences;

and/or

20 B) mixtures of from 10 to 90% by mass of aminotriazine ethers A) and from 90 to 10% by mass of polyaminotriazine ethers having molar masses of from 300 to 5000, the polyaminotriazine ethers being formed by thermal autocondensation of aminotriazine ethers A),

and

30 C) isocyanates of the formula $R_6(N = C = O)_2$, where $R_6 = C_6\text{-C}_{14}\text{-arylene}$, $C_4\text{-C}_{18}\text{-alkylene}$ and/or $C_5\text{-C}_8\text{-cycloalkylene}$, and/or oligomeric polyesters or polyethers having terminal isocyanate groups and

molar masses of from 200 to 5000,

the molar ratio of triazine segment to carbamic ester groups being from 1 : 1 to 1 : 4.

5

10

2. The prepreg as claimed in claim 1, characterized in that the textile substrate materials are woven fabrics or nonwovens, preferably woven fabrics or nonwovens comprising glass fibers, carbon fibers, polyamide fibers, polyester fibers, polypropylene fibers and/or thermosetting plastic fibers.

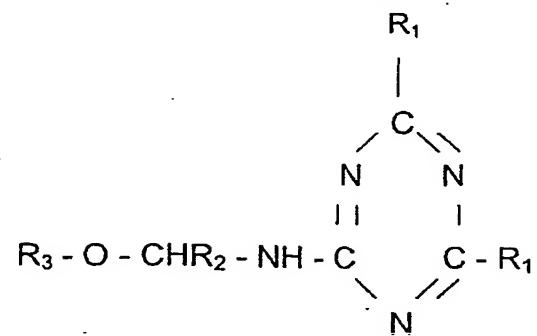
3. The prepreg as claimed in claim 1 or 2,
characterized in that the ratio of aldehyde
component to triazine component is from 1 : 1 to
5 3 : 1 in the polyaminotriazine ethers containing
carbamic ester groups.

10 4. The prepreg as claimed in at least one of the
preceding claims, characterized in that the
polyaminotriazine ethers containing carbamic ester
groups are polyaminotriazine ethers based on
melamine, formaldehyde, methanol and diisocyanates
of the type $R_6(N = C = O)_2$.

15 5. The prepreg as claimed in at least one of the
preceding claims, characterized in that the
polyaminotriazine ethers containing carbamic ester
groups are polyaminotriazine ethers based on
B) mixtures of from 5 to 30% by mass of
20 aminotriazine ethers A) and from 95 to 70% by mass
of polyaminotriazine ethers having molar masses of
from 300 to 5000, the polyaminotriazine ethers
being formed by thermal autocondensation of
aminotriazine ethers A), and
25 C) isocyanates of the formula $R_6(N = C = O)_2$, where
 $R_4 = C_4-C_{18}$ -alkylene and/or C_5-C_8 -cycloalkylene,
and/or oligomeric polyesters or polyethers having
terminal isocyanate groups and molar masses of
from 200 to 5000.

30 6. A process for the production of prepgs for fiber
composites having high strength and resilience,
characterized in that prepgs which comprise from
50 to 85% by mass of sheet-like textile structures
35 and from 15 to 50% by mass of polyaminotriazine
ethers containing carbamic ester groups are
produced by a melt application method in which
mixtures of

A) aminotriazine ethers of the structure



R₁ = -NH₂, -NH-CHR₂-OH, -NH-CHR₂-O-R₃,
 -NH-CHR₂-O-R₄-OH, -CH₃, -C₃H₇, -C₆H₅, -OH,
 phthalimido, succinimido-, -NH-CO-C₅-C₁₈-alkyl,
 -NH-C₅-C₁₈-alkylene-OH,
 5 -NH-CHR₂-O-C₅-C₁₈-alkylene-NH₂,
 -NH-C₅-C₁₈-alkylene-NH₂,

R₂ = -H, -C₁-C₇-alkyl;
 R₃ = -C₁-C₁₈-alkyl, -R₄-OH,

10

R₄ = -CH(CH₃)-CH₂-O-C₂-C₁₂-alkylene-O-CH₂-CH(CH₃)-,
 -CH(CH₃)-CH₂-O-C₂-C₁₂-arylene-O-CH₂-CH(CH₃)-,
 -[CH₂-CH₂-O-CH₂-CH₂]_n-,

-[CH₂-CH(CH₃)-O-CH₂-CH(CH₃)]_n-,

15

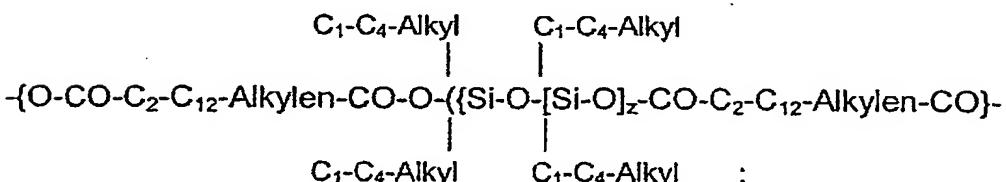
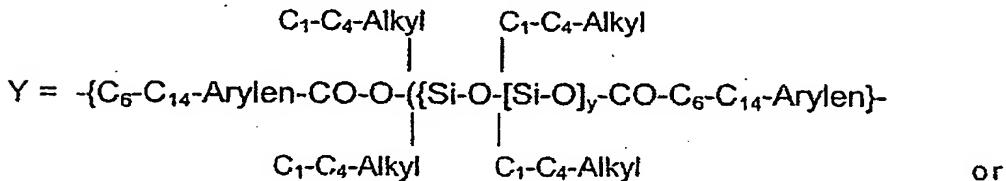
-[O-CH₂-CH₂-CH₂-CH₂]_n-,
 -[(CH₂)₂₋₈-O-CO-C₆-C₁₄-arylene-CO-O-(CH₂)₂₋₈]_n-,
 -[(CH₂)₂₋₈-O-CO-C₂-C₁₂-alkylene-CO-O-(CH₂)₂₋₈]_n-,

where n = 1 to 200;

20

- polyester sequences containing siloxane groups
 of the type -[(X)_r-O-CO-(Y)_s-CO-O(X)_r]-, in
 which

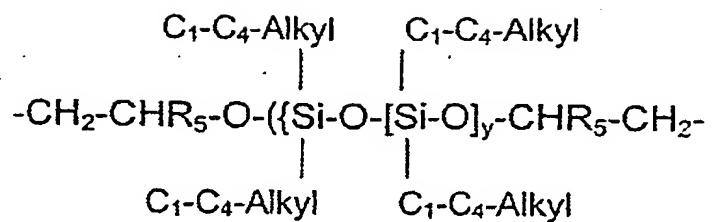
X = { (CH₂)₂₋₈-O-CO-C₆-C₁₄-arylene-CO-O-(CH₂)₂₋₈} - or
 { (CH₂)₂₋₈-O-CO-C₂-C₁₂-alkylene-CO-O-(CH₂)₂₋₈} -;



25

r = 1 to 70; s = 1 to 70 and y = 3 to 50;

- polyether sequences containing siloxane groups
 of the type



where $R_5 = H$; $C_1\text{-C}_4\text{-alkyl}$ and $y = 3$ to 50 ;

5

- sequences based on alkylene oxide adducts of melamine of the type comprising 2-amino-4,6-di- $C_2\text{-C}_4\text{-alkyleneamino-1,3,5-triazine}$ sequences:

5 - phenol ether sequences based on dihydric phenols and C₂-C₈-diols of the type comprising -C₂-C₈-alkylene-O-C₆-C₁₈-arylene-O-C₂-C₈-alkylene sequences;

and/or

10 B) mixtures of from 10 to 90% by mass of aminotriazine ethers A) and from 90 to 10% by mass of polyaminotriazine ethers having molar masses of from 300 to 5000, the polyaminotriazine ethers being formed by thermal autocondensation of aminotriazine ethers A),

and

15 C) isocyanates of the formula R₆(N = C = O)₂, where R₆ = C₆-C₁₄-arylene, C₄-C₁₈-alkylene and/or C₅-C₈-cycloalkylene, and/or oligomeric polyesters or polyethers having terminal isocyanate groups and molar masses of from 200 to 5000,

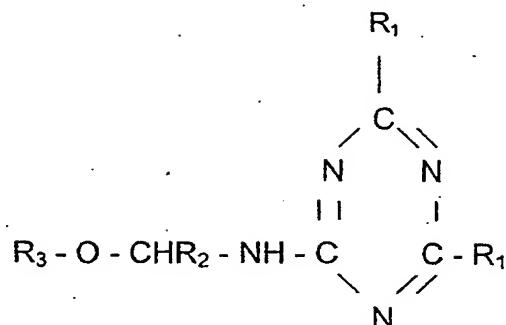
20 the molar ratio of diisocyanate to the sum of imino groups and amino groups in the triazine sequence being from 0.15 : 1 to 0.65 : 1, and it being possible for the mixtures to contain from 0.05 to 2% by mass, based on the aminotriazine ethers, of latent curing agents,

25 are melted at temperatures of from 85 to 130°C, reacted, and applied to textile substrate materials.

30 7. A process for the production of prepgs for fiber composites having high strength and resilience, characterized in that prepgs which comprise from 50 to 85% by mass of sheet-like textile structures and from 15 to 50% by mass of polyaminotriazine ethers containing carbamic ester groups are produced by a liquid application method in which

dispersions in C₅-C₁₂-hydrocarbons and/or C₃-C₁₂-ketones or solutions in dimethyl sulfoxide, dimethylformamide and/or dimethylacetamide having a solids content of from 25 to 70% by mass,
5 comprising

A) aminotriazine ethers of the structure



$R_1 = -N H_2, \quad -N H - C H R_2 - O H, \quad -N H - C H R_2 - O - R_3,$
 5 $-N H - C H R_2 - O - R_4 - O H, \quad -C H_3, \quad -C_3 H_7, \quad -C_6 H_5, \quad -O H,$
 phthalimido, succinimido-, $-N H - C O - C_5 - C_{18}$ -alkyl,
 $-N H - C_5 - C_{18}$ -alkylene-OH,
 $-N H - C H R_2 - O - C_5 - C_{18}$ -alkylene-NH₂,
 $-N H - C_5 - C_{18}$ -alkylene-NH₂,

10

$R_2 = -H, \quad -C_1 - C_7$ -alkyl;
 $R_3 = -C_1 - C_{18}$ -alkyl, $-R_4 - O H,$

15

$R_4 = -C H (C H_3) - C H_2 - O - C_2 - C_{12}$ -alkylene-O-C₂-CH(C₂H₃)-,
 $-C H (C H_3) - C H_2 - O - C_2 - C_{12}$ -arylene-O-C₂-CH(C₂H₃)-,
 $-[C H_2 - C H_2 - O - C H_2 - C H_2]_n - ,$
 $-[C H_2 - C H (C H_3) - O - C H_2 - C H (C H_3)]_n - ,$
 $-[O - C H_2 - C H_2 - C H_2 - C H_2]_n - ,$
 $-[(C H_2)_{2-8} - O - C O - C_6 - C_{14}$ -arylene-CO-O-(C₂H₃)₂₋₈]_n - ,

20

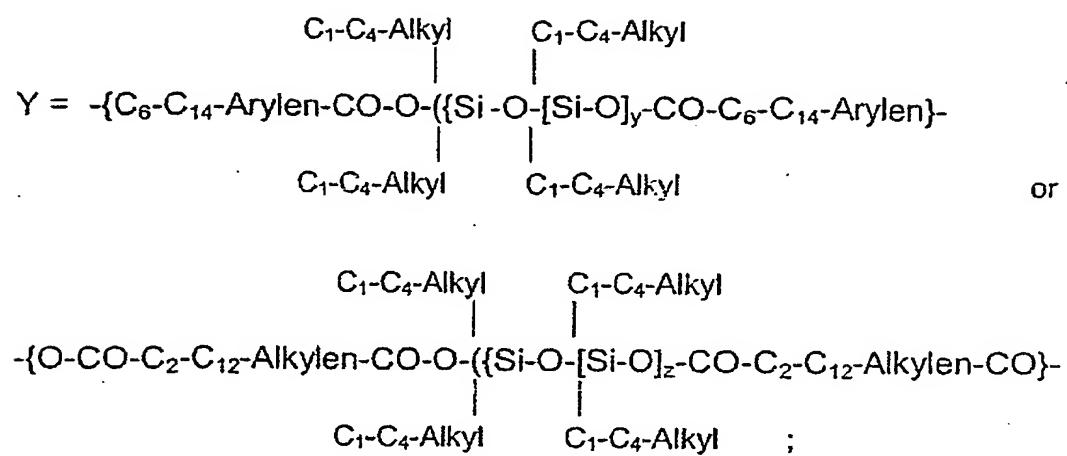
$-[(C H_2)_{2-8} - O - C O - C_2 - C_{12}$ -alkylene-CO-O-(C₂H₃)₂₋₈]_n - ,

where n = 1 to 200;

- polyester sequences containing siloxane groups
of the type $-[(X)_r - O - C O - (Y)_s - C O - O - (X)_r] -$, in
which

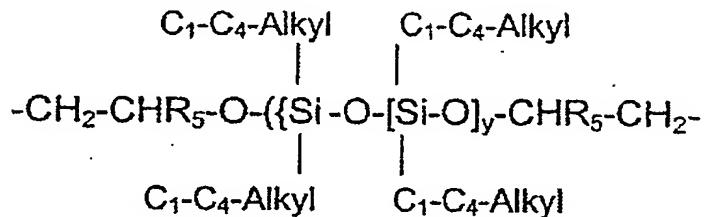
25

$X = \{(C H_2)_{2-8} - O - C O - C_6 - C_{14}$ -arylene-CO-O-(C₂H₃)<sub>2-8\} or
 $\{(C H_2)_{2-8} - O - C O - C_2 - C_{12}$ -alkylene-CO-O-(C₂H₃)_{2-8\};}</sub>



r = 1 to 70; s = 1 to 70 and y = 3 to 50;

- polyether sequences containing siloxane groups and of the type



5

where R₅ = H; C₁-C₄-alkyl and y = 3 to 50;

- sequences based on alkylene oxide adducts of melamine of the type comprising 2-amino-4,6-di-C₂-C₄-alkyleneamino-1,3,5-triazine sequences;
- phenol ether sequences based on dihydric phenols and C₂-C₈-diols of the type comprising -C₂-C₈-alkylene-O-C₆-C₁₈-arylene-O-C₂-C₈-alkylene sequences;

15

and/or

B) mixtures of from 10 to 90% by mass of aminotriazine ethers A) and from 90 to 10% by mass of polyaminotriazine ethers having molar masses of from 300 to 5000, the polyaminotriazine ethers being formed by autocondensation of triazine ethers A),

25

and

C) isocyanates of the formula R₆(N = C = O)₂, where R₆ = C₆-C₁₄-arylene, C₄-C₁₈-alkylene and/or C₅-C₈-cycloalkylene, and/or oligomeric polyesters or polyethers having terminal isocyanate groups and molar masses of from 200 to 5000,

30

the molar ratio of diisocyanate to the sum of imino groups and amino groups in the triazine sequence being from 0.15 : 1 to 0.65 : 1, and

it being possible for the mixtures to contain from 0.05 to 2% by mass, based on the aminotriazine ethers, of latent curing agents,

5

are applied at temperatures from 5 to 80°C to textile substrate materials and reacted at from 80 to 120°C/from 0.1 to 1 bar and dried.

10 8. The process for the production of prepregs as claimed in claim 6 or 7, characterized in that the aminotriazine ether used is 2,4,6-tris(methoxymethylamino)-1,3,5-triazine.

9. The process for the production of prepgs as claimed in at least one of claims 6 to 8, characterized in that the latent curing agents used are weak acids, preferably

5 - blocked sulfonic acids,

- alkali metal salts or ammonium salts of phosphoric acid,

10 - C₁-C₁₂-alkyl esters or C₂-C₈-hydroxyalkyl esters of aromatic C₆-C₁₄-carboxylic acids or inorganic acids,

15 - salts of melamine or guanamines with aliphatic C₁-C₁₈-carboxylic acids,

- anhydrides, monoesters or monoamides of C₄-C₂₀-dicarboxylic acids,

20 - monoesters or monoamides of copolymers of ethylenically unsaturated C₄-C₂₀-dicarboxylic anhydrides and ethylenically unsaturated monomers of the type comprising C₂-C₂₀-olefins and/or C₈-C₂₀-vinyl aromatics, and/or

25 - salts of C₁-C₁₂-alkylamines or alkanolamines with aliphatic C₁-C₁₈-carboxylic acids, aromatic C₆-C₁₄-carboxylic acids or alkylaromatic carboxylic acids and inorganic acids of the hydrochloric acid, sulfuric acid or phosphoric acid type.

10. A fiber composite produced using prepgs as claimed in one or more of claims 1 to 5.

30 11. The use of a fiber composite as claimed in claim 10 for heat protection clothing, fire protection blankets, electrical insulation papers, construction parts and vehicle fittings.